ASSSIGNMENT 3

Textbook Assignment: "Boilers," chapter 4, pages 4-1 through 4-15, and "Steam Turbines," chapter 5, pages 5-1 through 5-1.

3-1. What is the function of a boiler in the steam cycle?

1. To convert water into steam
2. To convert steam into water
3. To convert thermal energy into chemical energy
4. To convert mechanical energy into thermal energy

3-2. Which of the following NSTM chapters contains information on boilers?

1. Chap 079
2. Chap 090
3. Chap 221
4. Chap 554

3-3. What compartment contains the boilers, the station for firing or operating the boilers, and the main propulsion engines?

1. The boiler room
2. The main machinery room
3. The fireroom
4. The boiler operating station

3-4. What term refers to the time during which the boilers have fires lighted until the fires are secured?

1. Steam drum pressure
2. Design temperature
3. Superheater outlet pressure
4. Steaming hours

3-5. Boiler overload capacity is usually what percent of boiler full-power capacity?

1. 100%
2. 110%
3. 120%
4. 130%

3-6. Which of the following terms refers to the actual temperature at the superheater outlet?

1. Design temperature
2. Operating temperature
3. Total heating 'surface temperature
4. Economizer surface temperature

3-7. As far as boilers are concerned, what is the only distinction between a drum and a header?

1. Size
2. Color
3. Headers may be entered by a person
4. Drums may not be entered by a person

3-8. Which of the following components can be found on boilers used onboard naval ships?

1. Steam and water drums
2. Generating and circulating tubes
3. Superheaters and economizers
4. All of the above

3-9. During normal operation, the water in the steam drum is kept at approximately what level?

1. Full
2. 1/2 full
3. 1/3 full
4. 1/4 full

3-10. In reference to the water drum, which of the following statements is accurate?

1. The water drum is the same size as the header
2. The water drum is larger than the steam drum
3. The water drum is smaller than the header
4. The water drum is larger than the header

3-11. Downcomers range in diameter from 3 inches to

1. 9 inches
2. 8 inches
3. 6 inches
4. 4 inches

3-12. Generating tubes are made of what type of metal?

1. Steel
2. Copper
3. Brass
4. Tin

3-13. The surface blow pipe is used for which of the following purposes?

1. To remove suspended solid matter that floats on top of the water
2. To lower the steam drum water level
3. To blow water out to lower the chemical level in the boiler when it becomes too high
4. All of the above

3-14. How many people are required during boiler light off?

1. One
2. Two
3. Three
4. Four

3-l5. In reference to boiler design pressure, which of the following statements is accurate?

1. Design pressure is the same as operating pressure
2. Design pressure is lower than operating pressure
3. Design pressure is not given in the manufacturer’s technical manual for a particular boiler
4. Design pressure is the maximum pressure specified by the boiler manufacturer as a criterion for boiler design

3-16. Why are single-furnace boilers often referred to as D-type boilers?

1. They are manufactured by the Delta Manufacturing Company
2. The tubes form a shape that looks like the letter D
3. The steam and water always flow down
4. The D indicates a double boiler-wall thickness

3-17. In naval propulsion plants, where are the burners usually located?

1. At the front of the boiler
2. At the back of the boiler
3. On the right side of the boiler
4. On the left side of the boiler

3-18. On almost all boilers used in the propulsion plants of naval ships, what protects the superheater tubes from radiant heat?

1. Water screen baffles
2. Insulating block
3. Air tubes
4. Water screen tubes

3-1. What is the approximate operating pressure range for header-type boilers?

1. 300 to 425 psi
2. 435 to 700 pal
3. 700 to 825 pal
4. 825 to 925 psi

3-20. What tubes lead from the water drum to the steam drum?

1. Generating tubes
2. Sidewall tubes
3. Superheater tubes
4. Water wall tubes

3-21. Which of the following are used to reduce the swirling motion of the water as it enters the downcomers?

1. Scrubbers
2. Screen plates
3. Vortex eliminators
4. Steam separators

3-22. Where does the steam go after it leaves the scrubbers?

1. To the cyclone steam separator
2. To the front vortex eliminator
3. To the surface blow pipe
4. To the dry pipe

3-23. Which of the following devices break up the fuel into very fine particles?

1. Atomizers
2. Diffuser plates
3. Air foils
4. Baffles

3-24. Hero designed and built which of the following types of engines?

1. Gas-powered
2. Electric-powered
3. Steam-powered
4. Solar-powered

3-25. Hero’s turbine (aeolipile) consists of a hollow sphere with a total of how many canted nozzles?

1. One
2. Two
3. Three
4. Four

3-26. The water wheel that was used to operate the flour mills in colonial times and the common windmill used to pump water are examples of what principle?

1. The turbine principle
2. The reciprocating engine principle
3. The solar energy principle
4. The gravity flow principle

3-27. What two methods are used in turbine design and construction to get the desired results from a turbine?

1. Steam and rotary principles
2. Rotary and reciprocating
3. Impulse and reaction principles
4. Reaction and rotary principles

3-28. The energy to rotate an impulse turbine is derived from what source?

1. The potential energy of the heat flowing through the nozzles
2. The kinetic energy of the steam flowing through the turbine shaft
3. The mechanical energy of the turbine shaft derived from the atomizers
4. The kinetic energy of the steam flowing through the nozzles

3-29. As the steam passes through a nozzle, potential energy is converted into what other type of energy?

1. Mechanical potential energy
2. Kinetic energy
3. Thermal energy
4. Chemical energy

3-30. Impulse turbines may be used to drive which of the following equipment?

1. Forced draft blowers
2. Pumps
3. Main propulsion turbines
4. All of the above

3-31. Hero’s turbine was invented long before Newton’s time, but It was a working model of Newton’s

1. first law of motion
2. second law of motion
3. third law of motion
4. fourth law of motion

3-32. What does a reaction turbine use to drive the rotor?

1. The reaction of a steam jet
2. The reaction of a gas when converted to a solid
3. The reaction of a water jet
4. The reaction of a rapid change in steam temperature

3-33. What is generally stated in Newton’s third law of motion?

1. For every action there must be an equal and opposite reaction
2. Matter can be neither created nor destroyed
3. The total quantity of energy in the universe is always the same
4. At the molecular or submolecular level, heat transfer takes place through both the processes of conduction and radiation

3-34. In a reaction turbine, the stationary blades attached to the turbine casing act as nozzles and direct the steam to the

1. shaft
2. bearings
3. baffles
4. moving blades

3-35. When you let the air escape through the small opening in a balloon, what energy transformation is taking place?

1. Kinetic energy to potential energy
2. Potential energy to kinetic energy
3. Thermal energy to chemical energy
4. Mechanical energy to kinetic energy

3-36. A reaction turbine has all the advantages of an Impulse-type turbine, plus which of the following features?

1. A slower operating speed
2. Greater efficiency
3. Both 1 and 2 above
4. A faster operating speed

3-37. For nonsuperheated applications, turbine casings are made from which of the following materials?

1. Cast carbon steel
2. Brass
3. Tin
4. Plastic

3-38. For superheated applications, turbine casings are made from which of the following materials?

1. Carbon molybdenum steel
2. Cast carbon steel
3. Brass
4. Cast iron

3-39. What is the primary purpose of a turbine rotor?

1. To carry the moving blades that convert the steam’s kinetic energy to rotating mechanical energy
2. To convert mechanical energy to potential energy
3. To carry the stationary blades that convert the steam’s kinetic energy to chemical energy
4. To convert kinetic energy to hydraulic energy

3-40. The rotor of every turbine must be positioned radially and axially by what means?

1. Brushes
2. Wedges
3. Spaces
4. Bearings

3-41. Bearings are generally classified in which of the following ways?

1. Rotating or stationary
2. Stationary surface or rotating
3. Sliding surface or rolling contact
4. Hard or soft

3-42. Which of the following devices are used to prevent the leaking of steam out of or air into the turbine casing where the turbine rotor shaft extends through the turbine casing?

1. Rubber gaskets
2. Baffles
3. Steam deflectors
4. Shaft packing glands

3-43. Carbon packing rings mount around the turbine shaft and are held in place by which of the following devices?

1. Springs
2. Spacers
3. Washers
4. Bolts

3-44. Normally, what does the term “superheat control boiler” identify?

1. A single-furnace boiler
2. A double-furnace boiler
3. An auxiliary boiler
4. A natural-circulation boiler

3-45. The steam drum is a cylinder located at what boiler position?

1. At the top of the boiler
2. At the bottom of the boiler
3. On the left side of the boiler
4. On the right side of the boiler

3-46. How are headers on a boiler identified?

1. By their shape
2. By their size
3. By their location
4. By their color

3-47. The bottom blowdown valves should never be opened on a steaming boiler for which of the following reasons?

1. The circulation of the steam cycle will be interrupted
2. The insulating firebrick will be damaged
3. The baffle material will warp
4. The air casing will crack

3-48. At each end of the steam drum are a number of large tubes that lead to the water drum and sidewall header. What are these tubes called?

1. Sidewall tubes
2. Generating tubes
3. Bottom blow tubes
4. Downcomers

3-49. The sidewall (water wall) tubes in a boiler serve what function?

1. They heat the side wall of the furnace
2. They cool and protect the aide wall of the furnace
3. They cool and protect the soot blower
4. They heat the plastic chrome ore

3-50. The cyclone steam separators remove moisture from the steam, how is this accomplished?

1. By the steam flowing in a straight path
2. By an internal fan or blower
3. By the up and down movement of the separators
4. By the steam spinning or changing direction

3-51. In some boilers, the superheater headers are installed parallel with the water drum and the tubes are installed vertically, What are these superheaters called?

1. Parallel superheaters
2. Horizontal superheaters
3. Vertical superheater
4. Modified superheaters

3-52. As steam passes through the desuperheater, it is cooled for use in which of the following systems?

1. The economizer
2. The auxiliary steam systems
3. The main steam system
4. The water wall tubes

3-53. The desuperheater may be located either in the steam drum or what other location?

1. The water drum
2. The economizer
3. The registers
4. The ductwork

3-54. The furnace, or firebox, is the large space where air and fuel are mixed for the fire that heats the water in which of the following components?

1. Drums
2. Tubes
3. Headers
4. All of the above

3-55. A forced draft blower is a large volume fan that can be powered by an electric motor or what other source?

1. A gas-driven engine
2. A two-stage hydraulic motor
3. A steam turbine
4. An auxiliary

3-56. The return-flow atomizer provides a constant supply of fuel-oil pressure. Any fuel oil not needed to meet steam demand is returned to what location?

1. The whirling chamber
2. The fuel-oil service tank
3. The economizer
4. The desuperheater

3-57. The vented-plunger atomizer is unique in that it is the only atomizer in use in the Navy that has which of the following features?

1. Moving parts
2. Stationary parts
3. A steam supply
4. An oil supply

3-58. In most boilers, what is used to light fires?

1. A firing cap
2. Flint
3. A torch
4. Friction igniters

3-59. For specific instructions on boiler light-off procedures, what should you refer to?

1. NSTM, Chap 555
2. Your ship’s EOSS
3. NSTM, Chap 505
4. NAVOSH Program Manual

3-60. For information on auxiliary boilers, you should refer to which of the following publications?

1. NSTM, Chap 555
2. NSTM, Chap 505
3. NSTM, Chap 254
4. NSTM, Chap 221